THE JOURNAL OF WILDLIFE MANAGEMENT

VOLUME 23

Charles M. Kirkpatrick, *Editor*
Department of Forestry and Conservation, Purdue University

Frank F. Hooper, *Associate Editor*
Institute for Fisheries Research, Michigan Department of Conservation

Helmut K. Buechner, *Review Editor*
Department of Zoology, Washington State University

EDITORIAL BOARD

Thomas S. Baskett, Missouri Coop. Wildlife Research Unit
George W. Bennett, Illinois Natural History Survey
C. H. D. Clarke, Ont. Dept. Lands and Forests
William H. Elder, University of Missouri
F. N. Hamerstrom, Jr., Wis. Cons. Dept.
Don W. Hayne, Michigan Conservation Dept.
George H. Kelker, Utah State University
Edward L. Kozicky, Olin Mathieson Chemical Corp.
William L. Jellison, National Microbiological Institute
Robert D. McDowell, University of Connecticut
William H. Marshall, University of Minnesota
David A. Munro, Canadian Wildlife Service
Robert L. Rausch, Arctic Health Research Center
Thomas G. Scott, Illinois Natural History Survey
Richard D. Taber, Montana State University

Published by
THE WILDLIFE SOCIETY
at
THE ALLEN PRESS
LAWRENCE, KANSAS
1959

THE WILDLIFE SOCIETY, 1959–60

Officers

President: Charles A. Dambach, Natural Resources Institute, Ohio State Univ., Columbus 10, Ohio.
Vice-President: Henry S. Mosby, Dept. of Biology, Virginia Polytechnic Institute, Blacksburg, Va.
Past President: A. Starker Leopold, Museum of Vertebrate Zoology, Univ. of Calif., Berkeley 4, Calif.
Executive Secretary: Joseph P. Linduska, Remington Farms, Chestertown, Md.

Regional Representatives

Roger M. Latham (Region 1, northeast), Gibsonia, Pennsylvania.
Leslie L. Glasgow (Region 2, southeast), Louisiana State Univ., Baton Rouge, Louisiana.
Jack H. Berryman (Region 3, north central), Fish and Wildlife Service, Minneapolis 8, Minnesota.
Lee E. Yeager (Region 4, northern great plains), Colorado Cooperative Wildlife Research Unit, Fort Collins, Colorado.
Wendell G. Swank (Region 5, southwest), 805 West State Avenue, Phoenix, Arizona.
Jessop B. Low (Region 6, far west), Utah Cooperative Wildlife Research Unit, Logan, Utah.
David A. Munro (Region 7, Canada), Canadian Wildlife Service, 150 Wellington St., Ottawa, Ontario.

Trustees

C. R. Gutermuth, 1960; Daniel L. Leedy, 1961; Arnold L. Nelson, 1962.

Committees

African Wildlife: Helmut K. Buechner, Chairman; William M. Longhurst, George A. Petrides.
Audit and Elections: C. Gordon Fredine, Chairman; Walter F. Crissy, Norman G. Wilder.
Code of Ethics: Stewart Brandborg, Chairman; James C. Salinas, John Seubert.
Conservation Education Publication Award: Joseph J. Shomon, Chairman; Jack C. Culbreath, Robert K. Davis, James B. Trefethen, Douglas E. Wade.
Constitution and Bylaws: Gustav A. Swanson, Chairman; Daniel L. Leedy, Justin W. Leonard, A. Starker Leopold, George A. Petrides.
Economic Losses Caused by Vertebrates: Donald A. Spencer, Chairman; Robert Eadie, Raymond C. Erickson, William D. Fitzwater, W. E. Howard.
Employment: George P. Spinner, Chairman; William B. Davis, George H. Kelker, J. W. Kimball, Edward V. Komarek.
Fisheries Publication Award: Paul H. Eschmeyer, Chairman; W. Harry Everhart, John S. Gottschalk, W. E. Ricker, Joseph H. Wales.
History of the Wildlife Society: E. R. Kalmbach, Chairman; W. L. McAtee, Tracy L. Storer.
Leopold Medal Award: Arthur S. Hawkins, Chairman; C. H. D. Clarke, Clarence Cottam, A. Starker Leopold, Gustav A. Swanson.
Manual of Wildlife Techniques: Henry S. Mosby, Chairman; Ian McTaggart Cowan, David E. Davis, Antoon de Vos, Alexander C. Martin, Horace F. Quick, Richard D. Taber.
Membership: Lee E. Yeager, Chairman; Regional Representatives and State Chairmen.
Memorials: Leonard E. Foote, Chairman.
Nominations: W. C. Glazener, Chairman; Wallace Anderson, Fred S. Barkalow, Jr., W. Winston Mair, A. H. Underhill.
Preparation of Awards: John D. Findlay, Chairman.
Professional Wildlife Training: Paul D. Dalke, Chairman; E. L. Cheatum, Joseph J. Hickey, Thomas L. Kimball, Vincent Schultz.
Technical Sessions, 25th North American Wildlife Conference: John L. Buckley, Chairman.
Terrestrial Wildlife Publication Award: Kenneth E. Hungerford, Chairman; James F. Bendell, E. Reade Brown, Robert S. Dorney, James H. Jenkins.
Wild Turkey Monograph: James S. Lindzey, Chairman; John W. Aldrich, W. C. Glazener, Roger Latham, Henry S. Mosby.

Appointed Representatives

To *International Wildlife Biologists' Congress:* Antoon de Vos.
To *National Research Council:* Fred H. Dale.
To *National Watershed Congress:* James T. McBroom.
To *Waterfowl Advisory Committee:* John M. Anderson.
Editor: The Journal of Wildlife Management: Charles M. Kirkpatrick.
Editor: Wildlife Monographs: Louis A. Krumholz.
Editor: Wildlife Society News: Thomas R. Evans.

CONTENTS FOR VOLUME 23

NUMBER 1—JANUARY

Movements and Behavior of a Wolf Pack in Alaska ... *Bob L. Burkholder* 1
Techniques of Trapping and Tagging the Collared Peccary ... *Bobby J. Neal* 11
Migration of Landlocked Salmon in the Fish River Lakes, Maine ... *Kendall Warner* 17
Breeding Season in Elk as Determined from Known-age Embryos ... *John A. Morrison, Charles E. Trainer, and Philip L. Wright* 27
Eleven Years of Rabbit-population Data in Missouri ... *Howard Wight* 34
Muskrat Breeding Biology at Delta, Manitoba ... *Peter F. Olsen* 40
Relative Estimates of Fox Population Levels ... *John E. Wood* 53
Feral Swine in the Southeastern United States ... *R. P. Hanson and Lars Karstad* 64
Fertility in the Northern Fur Seal, 1956–57 ... *Carl E. Abegglen and Alton Y. Roppel* 75
Available Nutrients in Selected Deer-browse Species Growing on Different Soils ... *Louis R. Hundley* 81
Editorial Note ... 90
A Study of Renesting in Canada Geese in Montana ... *Melvin G. Atwater* 91
Gulf Coast Marsh Vegetation as Food of Wintering Waterfowl ... *J. L. Chamberlain* 97
Status and Population Trend in Fox Squirrels on Fringe Range, Colorado ... *Lee E. Yeager* 102
Briefer Articles—Design of a Miniature Radio Transmitter for Use in Animal Studies, by *Cobert D. LeMunyan, William White, Ernest Nyberg, and John J. Christian*; Sharp-tailed Grouse Predation by Goshawk, by *G. A. Ammann*; Sexing Live-trapped Juvenile Ruffed Grouse, by *Walter L. Palmer*; Waterfowl Sickness Diagnoses in Minnesota, North Dakota and Manitoba, by *Eugene F. Bossenmaier*; A Plastic Hind-foot Measuring Device, by *William H. Adams, Jr.*; A Quick Method for Gross Analysis of Muskrat Stomach Contents, by *Andrew A. Arata*; Significance of Ground Nesting by Mourning Doves in Northwestern Oklahoma, by *Robert L. Downing*; Cysticerci of *Taenia krabbei* in Mule Deer in Colorado, by *O. Wilford Olsen and Jesse E. Williams*; Notes on the Prevalence of Hydatid Disease in Alaskan Moose, by *Robert A. Rausch* ... 107
Book Reviews ... 123

NUMBER 2—APRIL

Nesting Studies of Canada Geese on the Hanford Reservation, 1953–56 ... *W. C. Hanson and R. L. Browning* 129
Effect of 2,4–D on Abundance and Foods of Pocket Gophers ... *James O. Keith, Richard M. Hansen, and A. Lorin Ward* 137
Observations on *Leucocytozoon* in Pen-raised and Free-ranging Wild Turkeys ... *Mitchell A. Byrd* 145
Turbidity and Sedimentation at Lake Chautauqua, Illinois ... *Harry O. Jackson and William C. Starrett* 157
Food Habits of the Red Fox in Missouri ... *Leroy J. Korschgen* 168
Ecology of Muskrats in Strip-mine Ponds in Southern Illinois ... *Andrew A. Arata* 177
Highway Mortality as an Index of Deer-population Change ... *Laurence R. Jahn* 187
Field-feeding Periodicity of Black and Mallard Ducks ... *Robert W. Winner* 197
Some Population Mechanics of the American Coot ... *John H. Burton, II* 203
Establishment and Spread of the Wild Turkey in Southwestern Michigan ... *H. Lee Wilson and James Lewis* 210
Immediate Effects of Dieldrin and Heptachlor on Bobwhites ... *Sterling G. Clawson and Maurice F. Baker* 215
Editorial Notes ... 219
Briefer Articles—A Comparison of Methods for Estimating Squirrel Populations, by *V. F. Flyger*; A New Plastic Tape Marker for Birds and Mammals, by *Robert L. Downing and Charles M. Marshall*; The Estimation of the Food of Foxes, by *J. D. Lockie*; Dental Patterns as Age Indicators in Muskrats, by *Peter F. Olsen*; Feeding and Growth of a Captive Moose Calf, by *Donald G. Dodds*; A Macroscopic Ovary-sectioning Method, by *Douglas H. Pimlott and H. W. Mossman*; Fetal Recoveries in Mule Deer, by *Paul Hudson*; The Use of Radio–TV by State Wildlife Conservation Departments, by *Robert L. Phillips and Roland F. Rousseau*; Applicability of the Ascoli Test to Epizootic Tularemia in Wild Rodents, by *J. Frederick Bell, William L. Jellison, Cora R. Owen, and Carl L. Larson*; Wildlife Damage to Crops in the United States, by *Robert D. McDowell and Harold W. Pillsbury*; A Method for Measuring Mortality of Cottontail Rabbits in Winter, by *Rexford D. Lord, Jr.*; Some Effects of Sodium Pentobarbital Anesthesia on Juvenile Black Bears, by *W. G. Youatt and A. W. Erickson* 220
Obituaries ... 244
Book Reviews ... 245

NUMBER 3—JULY

ANNUAL AND SHOOTING MORTALITY ESTIMATES FOR THE CANVASBACK ..... *Aelred D. Geis* 253

FOOD HABITS OF THE COUGAR IN UTAH AND NEVADA ..... *W. Leslie Robinette, Jay S. Gashwiler, and Owen W. Morris* 261

A VEGETATIONAL STUDY OF THE CENTRAL WISCONSIN WINTER DEER RANGE ..... *James R. Habeck* 273

GROWTH AND PLUMAGE DEVELOPMENT OF WILD-TRAPPED JUVENILE CANVASBACK (*Aythya valisineria*) ..... *Alex Dzubin* 279

FACTORS INFLUENCING THE WINTER ROADSIDE COUNT OF COTTONTAILS ..... *Duane E. Newman* 290

EMBRYONIC AND FETAL DEVELOPMENT OF THE MULE DEER ..... *Paul Hudson and Ludvig G. Browman* 295

EXPERIMENTAL STARVATION OF PHEASANTS ..... *John R. Tester and Lorentz Olson* 304

A 4-YEAR STUDY OF WOOD DUCKS ON A PENNSYLVANIA MARSH ..... *Eugene Decker* 310

AGE DETERMINATION IN MOOSE FROM SECTIONED INCISOR TEETH ..... *David E. Sergeant and Douglas H. Pimlott* 315

VITAMIN A AND OHIO BOBWHITE QUAIL DURING THE WINTER OF 1947–48 ..... *Vincent Schultz* 322

THE WILDLIFE SOCIETY

REPORT OF THE EXECUTIVE SECRETARY FOR THE YEAR 1958–59 327

MINUTES OF THE WILDLIFE SOCIETY COUNCIL MEETING, MARCH 1, 1959 330

MINUTES OF THE ANNUAL BUSINESS MEETING, MARCH 2, 1959 332

ANNUAL REPORTS OF WILDLIFE SOCIETY COMMITTEES 333

BRIEFER ARTICLES—The Horns and Teeth as Indicators of Age in Bison, by *W. A. Fuller*; Brucellosis and Leptospirosis in White-tailed Deer in Michigan, by *W. G. Youatt, L. D. Fay, G. L. Whitehead, and J. P. Newman*; Additional Uses of Dyes for Studying the Movements of Small Mammals, by *John G. New*; Mourning Dove Foods in Florida during October and December, by *Stephen L. Beckwith*; Further Notes on Quail Density and Farm Composition, by *Vincent Schultz*; Mineral Analyses of Livers and Kidneys of Moose (*Alces americana*), by *D. A. Beeler, D. A. Benson, and W. M. Langille*; The Lens as an Indicator of Age in Cottontail Rabbits, by *Rexford D. Lord, Jr.*; Track Differentiation for Censusing Bear Populations, by *David R. Klein*; A Flexible, Plastic Eartag for Rabbits, by *Ronald F. Labisky and Rexford D. Lord, Jr.*; The Use of Curare and Curare-like Drugs on Elk (Wapiti), by *George Post* 342

OBITUARIES 367

BOOK REVIEWS 370

EDITORIAL ACKNOWLEDGMENTS 380

NUMBER 4—OCTOBER

REPRODUCTION AND PRODUCTIVITY OF NEWFOUNDLAND MOOSE ..... *Douglas H. Pimlott* 381

THE AGE OF SELF-SUFFICIENCY IN THE BLACK BEAR ..... *Albert W. Erickson* 401

SEED PRODUCTION BY CURLY-LEAVED PONDWEED AND ITS SIGNIFICANCE TO WATERFOWL ..... *George S. Hunt and Richard W. Lutz* 405

SOME EFFECTS OF A FIELD APPLICATION OF DIELDRIN ON WILDLIFE ..... *Thomas G. Scott, Yuell L. Willis, and Jack A. Ellis* 409

MIGRATION AND MORTALITY OF HAND-REARED REDHEADS (*Aythya americana*) ..... *Milton W. Weller and Peter Ward* 427

BASAL METABOLISM OF WHITE-TAILED DEER—A PILOT STUDY ..... *Helenette Silver, N. F. Colovos, and Haven H. Hayes* 434

MOURNING DOVE PRODUCTION IN FOUR IDAHO ORCHARDS AND SOME POSSIBLE IMPLICATIONS ..... *Edson Fichter* 438

BRIEFER ARTICLES—Observations on Spawning of Burbot in Lake Simcoe, Ontario, by *Hugh R. McCrimmon*; Prevention of Browsing by Deer in a Pine Plantation, by *Wakelin McNeel, Jr. and John Kennedy*; Breeding of Subadult Cottontail Rabbits in Ohio, by *Norman C. Negus*; Duck Food Habits in Southwestern Louisiana Marshes Following a Hurricane, by *Robert B. Kimble and Allen Ensminger*; Summer Browse Preferences of Adirondack White-tailed Deer, by *William L. Webb*; Response of *Lespedeza Bicolor* to Lime, Phosphate, and Potash, by *John I. Wear and Arnold O. Haugen*; Comparison of Early Morning and Spotlight Roadside Censuses for Cottontails, by *Rexford D. Lord, Jr.*; Longevity and Range of a Crippled Turkey Tom, by *Earl Franklin Kennamer*; A Counting Device for Recording Small Mammal Activities, by *James V. Griffo, Jr.* 447

BOOK REVIEWS 462

INDEX TO VOLUME 23 467

NOMINATIONS FOR WILDLIFE SOCIETY OFFICERS, 1960–61 474

is 253
is 261
ck 273
ya
in 279
an 290
an 295
on 304
er 310
ott 315
tz 322
.... 327
.... 330
.... 332
.... 333
er;
ay,
nts
nd
on,
by
ail
by
D.
.... 342
.... 367
.... 370
.... 380
ott 381
on 401
utz 405
llis 409
ard 427
yes 434
ter 438
R.
Jr.
us;
B.
er,
by
ide
key
les,
.... 447
.... 462
.... 467
.... 474